ERS Report Summary

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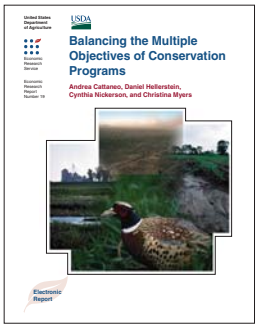

This is a summary of an ERS report.

Find the full report at ***www.ers.usda.gov/publications/err19***

Balancing the Multiple Objectives of Conservation Programs

Andrea Cattaneo, Daniel Hellerstein, Cynthia Nickerson, and Christina Myers

To help minimize the negative and maximize the positive environmental impacts of agricultural production, the Federal Government supports a variety of conservation programs. These include land retirement, working lands, and easement programs. Land retirement programs, such as the Conservation Reserve Program (CRP) and the Wetlands Reserve Program, pay landowners to implement environmentally enhancing practices on land they voluntarily take out of production. Working lands and easement programs, such as the Environmental Quality Incentive Program, Conservation Security Program, and the Farm and Ranch Lands Protection Program, pay participants to maintain or enhance conservation efforts on farmland kept in production. In 2005, expenditures for these programs exceeded $2.8 billion. Each of these programs seeks to achieve multiple environmental objectives, including reducing soil erosion, increasing water and air quality, and protecting wildlife habitat cost effectively.

What Is the Issue?

Implementing multi-objective programs efficiently requires balancing different environmental and economic objectives. A number of the largest U.S. conservation programs use an "index," in which measures of multiple environmental and cost objectives are weighted by program manager perceptions of relative importance. The index calculates a score for, and is used to rank, applications for enrollment submitted by potential program participants. This approach gives program managers the option, in each enrollment period, to change the relative weights assigned to each objective in the index. For example, new information about heightened public interest in protecting wildlife habitat may induce program managers to increase the weight on a wildlife habitat objective. Applications meeting the favored objective would then be prioritized, resulting in a different mix of applications selected from the pool of applicants. Getting new information about societal preferences for environmental outcomes can be expected, given that at present, little is known about how society values one environmental improvement over another. Also, little is known about the effect of index weight changes on environmental outcomes. That is, do small changes in weights significantly affect the mix of applications selected for enrollment, leading to very different program outcomes? Or do large changes in weights only minimally affect the selected set of applicants and thus have a limited impact on program outcomes?

What Did the Study Find?

Small changes to index weights made relatively little difference in environmental outcomes, but larger changes generated larger impacts in the CRP. Environmental outcomes in the CRP were not very sensitive to *small* changes in the program's index weights, even when the size of the enrollment was allowed to vary from 2 to 33 million acres. For example, environmental objectives sought in the CRP included soil erosion reduction, water quality improvements, and

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increased wildlife benefits, and these three objectives have received equal weight in recent years. A 10-percent change in the weight on the soil erosion weight objective increased erosion reduction benefits by 5 percent at most. Weight changes of more than 20 percent generated larger impacts on environmental outcomes. For example, an approximately 50-percent increase in the wildlife objective weight increased wildlife benefits up to 15 percent. The largest weight changes generated the largest changes in outcomes: tripling the erosion reduction weight increased erosion reduction benefits by 50 percent.

These findings may seem intuitive. Yet, they highlight that as long as CRP outcomes approximately reflect public preferences, then few opportunities exist for improving environmental outcomes by fine-tuning the index weights. But if new information suggests that an alternative mix of environmental improvements is preferred, program outcomes can be affected by larger changes in weights.

In terms of tradeoffs, only a large increase in the weight of a particular environmental objective caused losses of benefits related to other objectives. Throughout our analyses, tradeoffs occurred between achieving additional wildlife benefits and erosion reduction benefits, but the effects were relatively weak. Erosion reduction benefits declined 15 percent when the wildlife habitat weight doubled, and wildlife benefits declined about 5 percent when the erosion weight was doubled. Other tradeoffs appeared to have more modest responses, although this effect varied by region.

Changes in the CRP objectives' weights affected program costs more than environmental outcomes. In particular, improvements in water quality were more costly to obtain than other objectives. A 10-percent increase in water quality benefits generated by the CRP would increase costs up to 20 percent, while increasing wildlife benefits by 10 percent entailed less than a 14-percent cost increase. Also, benefits could be achieved more cost effectively when we simulated enrollment in a newly formed program. This effect suggests that achieving environmental improvements may become more expensive as ongoing enrollments reduce the pool of available lands.

When program objectives, overall program sizes, or other features are mandated by law, changing index weights can serve as a lever for moderately affecting CRP outcomes. In addition to changing index weights, program decision-makers may find that adjusting other program design features, such as eligibility criteria or the mix of allowable land management practices, or allowing weights to vary by region helps bring about changes in program outcomes.

How Was the Study Conducted?

The CRP has used an environmental benefits index (EBI) since the early 1990s to rank applications for land enrollment. In the CRP's 26th signup in 2003, the EBI considered several different types of objectives: wildlife habitat quality, water quality, erosion reduction potential, enduring benefits, air quality, and cost. We used CRP application and enrollment data from this signup to simulate how small and large changes in the EBI objectives' weights would affect the economic and environmental outcomes of the program. The simulations considered the types of land available for enrollment and the degree to which changes in index weights induce landowners to enroll different types of land. We examined the impacts of changing the weights for a single enrollment period (i.e., when 2 million acres are added to an ongoing program). We also simulated the effects of weight changes when no land was previously enrolled (that is, when 33 million acres are enrolled—simulating a full-program enrollment).

The analyses assumed applications scoring the highest among each of several objectives would have the largest actual environmental impacts in the CRP. As different simulations generated new scores for applications, different sets of farmland were selected for enrollment. Because each set contributed different environmental impacts and entailed different costs, different environmental and cost outcomes were possible.